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Title: Healthcare Impact Simulation Using HCSim

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Healthcare Impact Simulation Using HCSim

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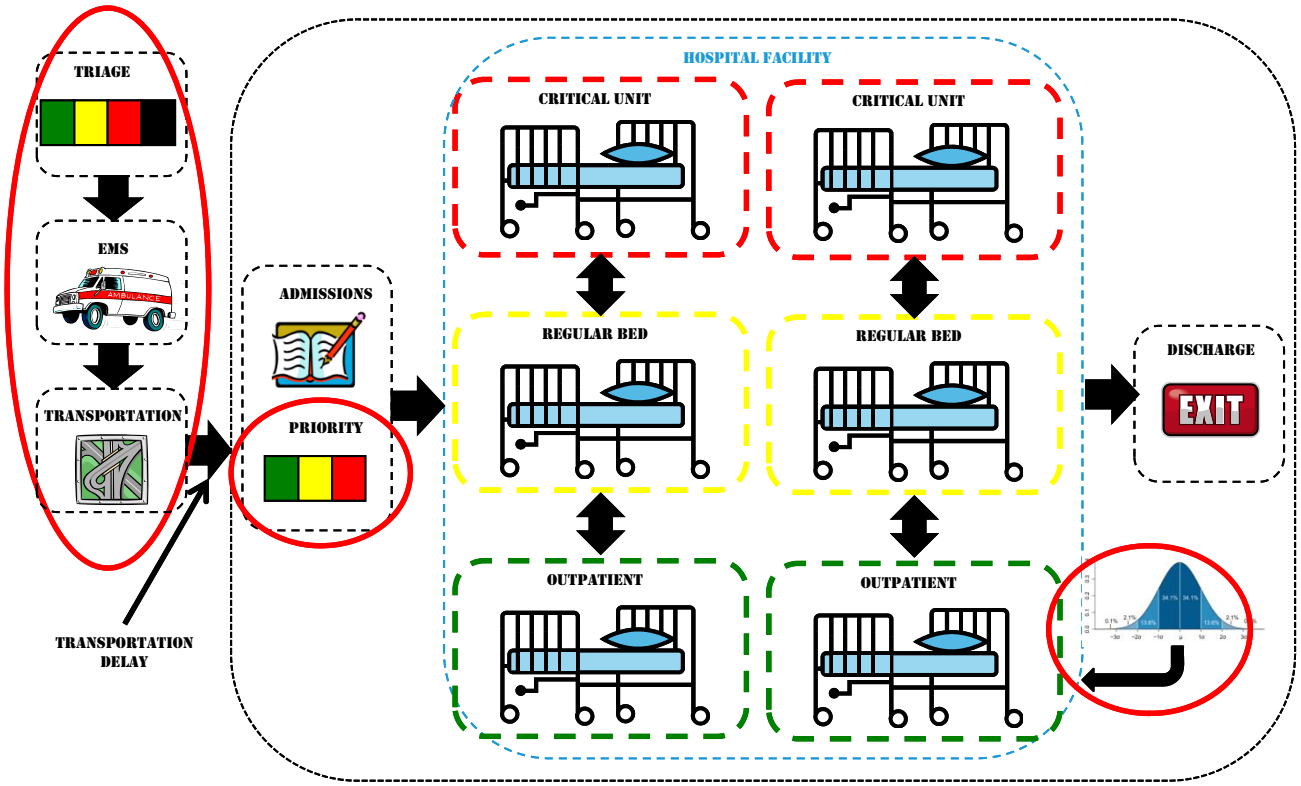
Abstract

- HCSim is an agent-based healthcare impact simulation code developed for the Department of Homeland Security and written in Java. It is intended to model the impact of unusual patient demand on the surge capacity of healthcare infrastructure. HCSim operates at urban-to-regional scales, and can produce static or dynamic results. This presentation describes the HCSim code's capabilities and architecture at a relatively high level appropriate for general, open discussion, and offers examples of its applicability in analyses.

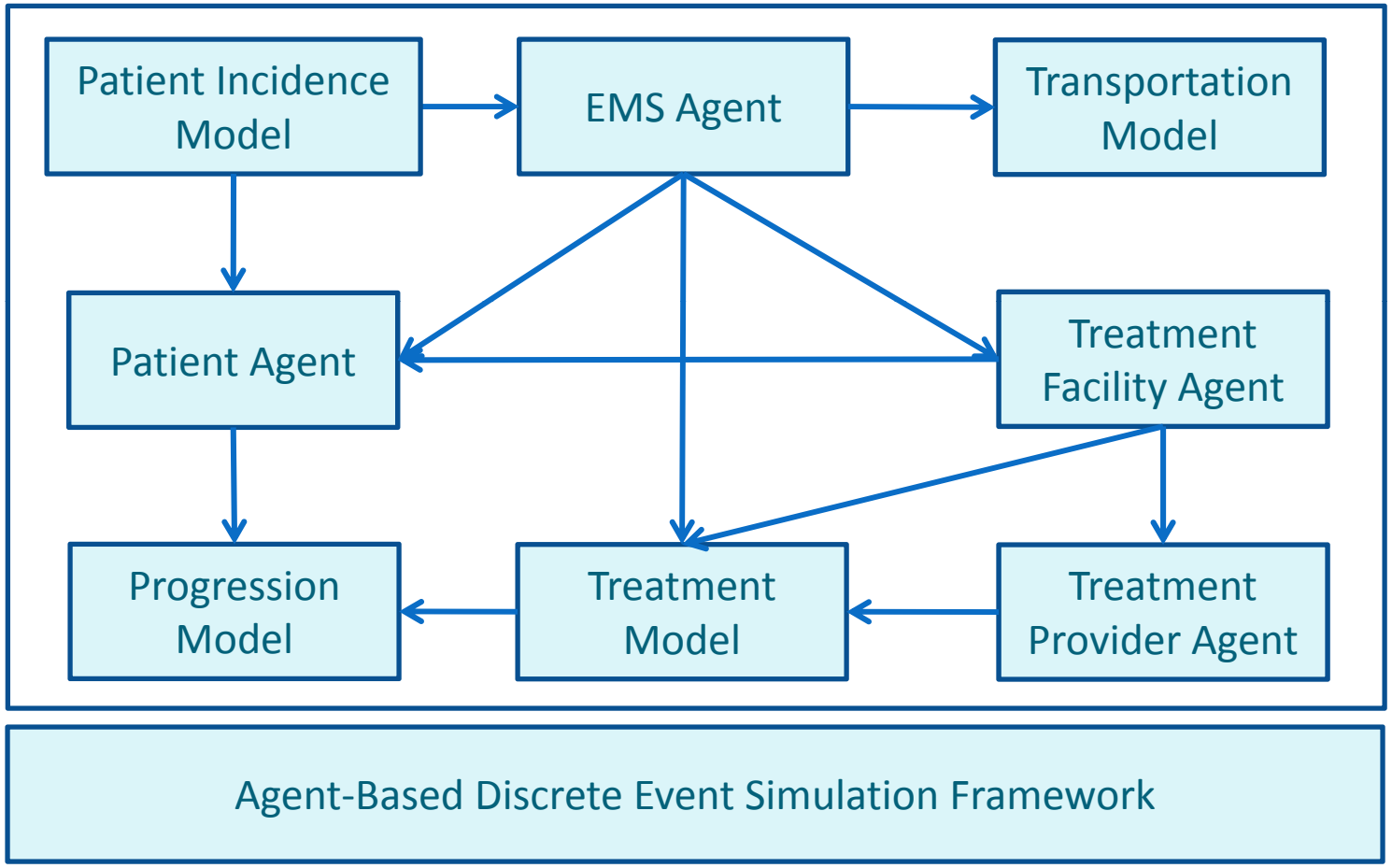
What is HCSim?

- HCSim is an agent-based healthcare impact simulation code developed for the Department of Homeland Security and written in Java
- It is intended to model the impact of unusual patient demand on the surge capacity of healthcare infrastructure
- Operates at urban-to-regional scale
- Can produce static or dynamic results

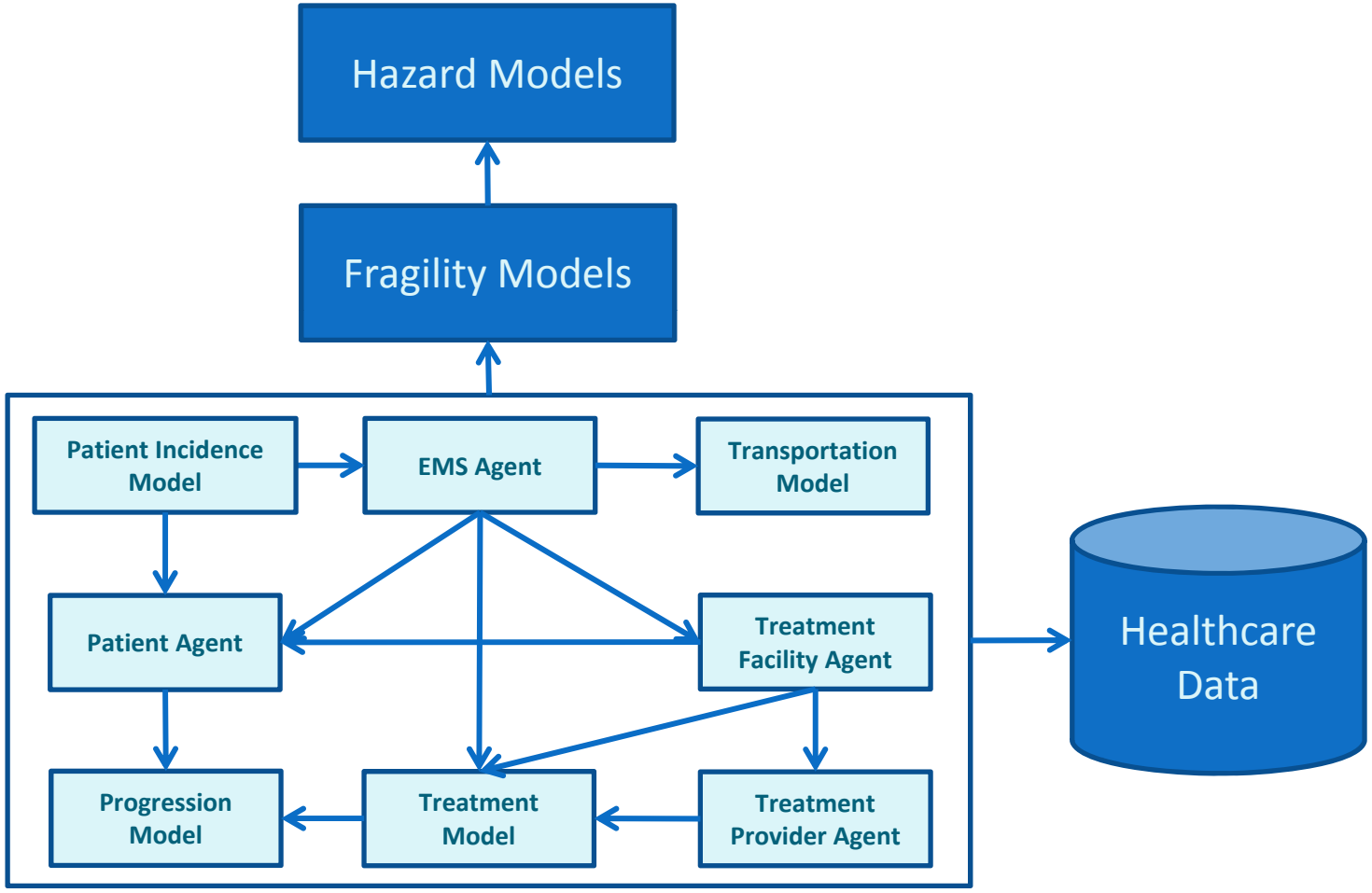
HCSim Model Overview



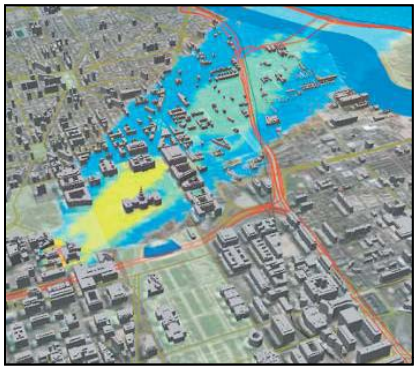
HCSim Architecture



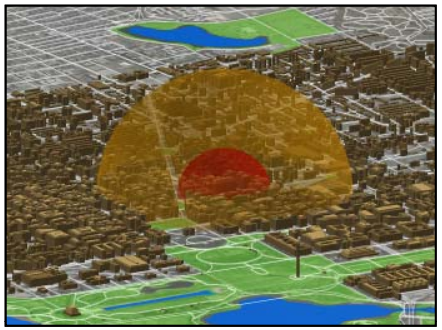
HCSim External Dependencies



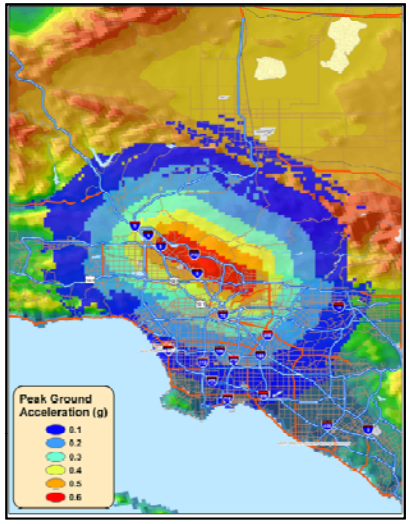
Applicability



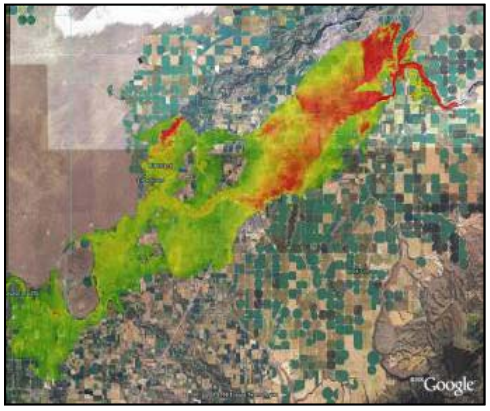
Anthrax Dispersion



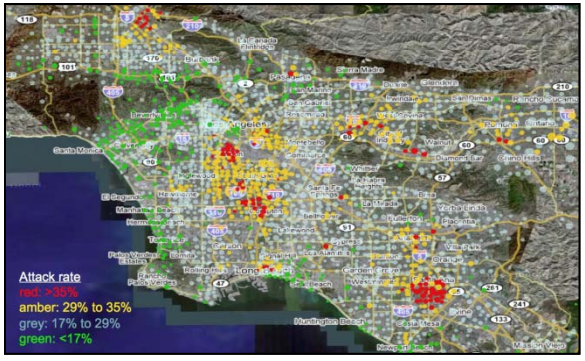
Improvised Nuclear Device



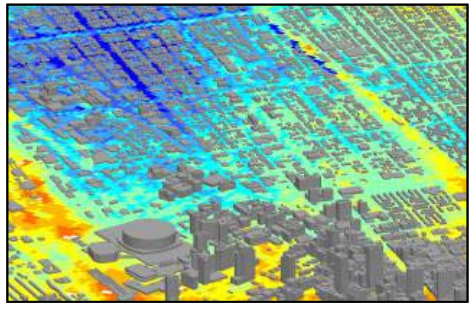
Earthquake



Dam Break



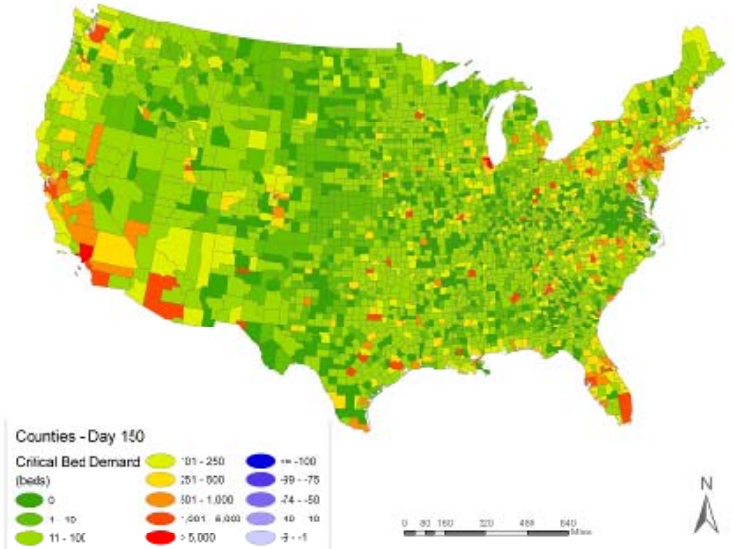
Pandemic Influenza

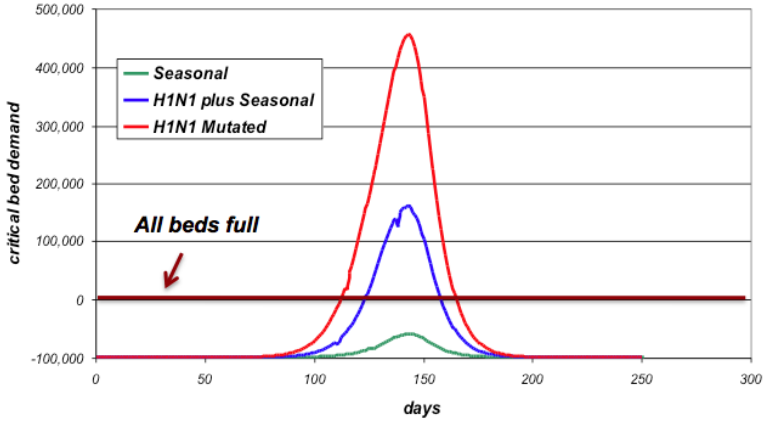


Flooding

Pandemic H1N1 Analysis

- Healthcare system cannot handle even a mild outbreak
  - At 70 – 100% initial occupancy, hospital will be overwhelmed
- Healthcare impacts are not geographically uniform
- Increased absenteeism may affect critical staff





Analyses supporting 2009 H1N1 Pandemic Response

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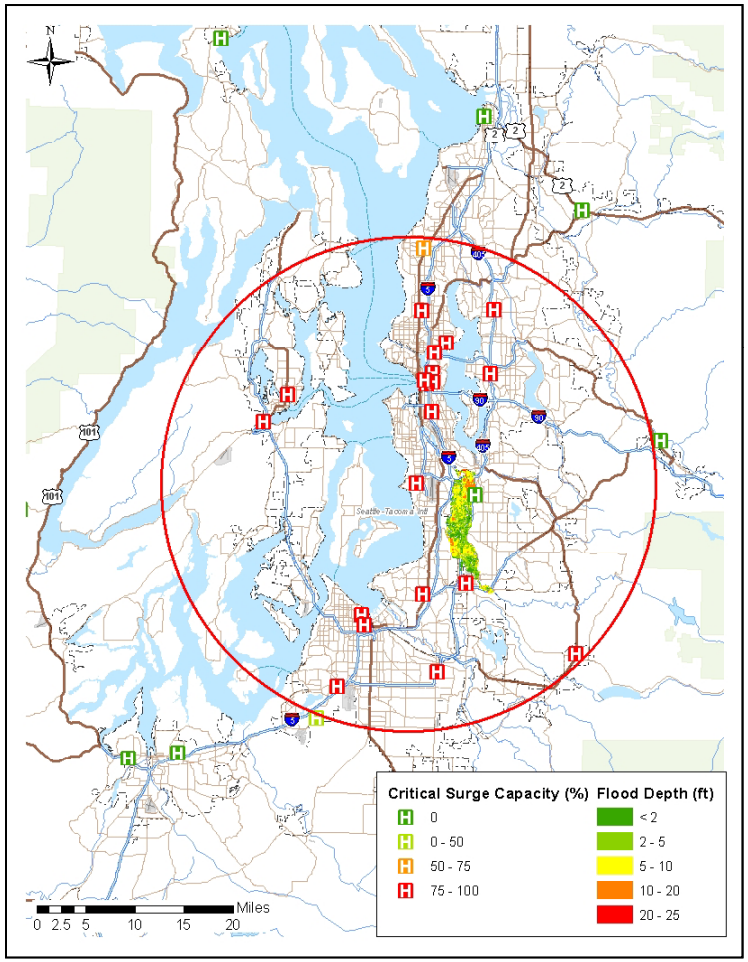
Flooding Analysis

- There is one hospital in the flooded area with over 2,000 patients
- There are over 200 injured people
- Evacuation of one hospital could affect at least 74 hospitals in the surrounding area
  - 22 hospitals with 100% critical care
  - 52 hospitals with 100% regular care
- Average distance traveled = 35 miles



Analyses supporting 2010 Green River Valley Preparedness

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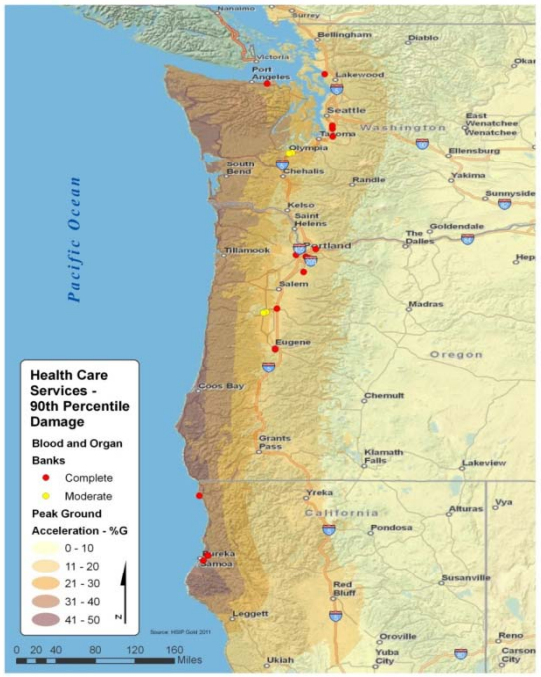
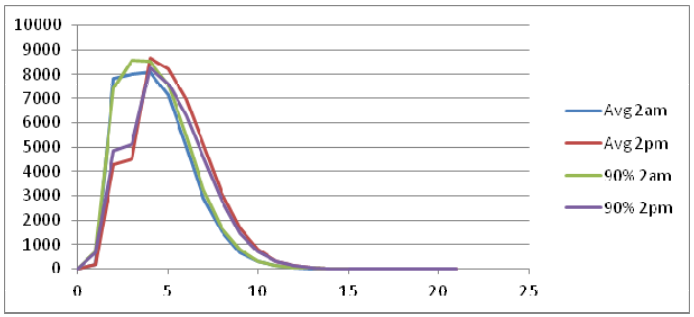
Cascadia Earthquake and Tsunami

- Hospitals destroyed:15 – 30
- Hospitals impacted: 900 – 1,100
- Patients admitted: 9,000 – 10,500
- Hospitals exceeding critical capacity: 150 – 310
- Maximum average person/distance (km): 300 – 400
- Damages to roads and bridges will cause EMS delays

Analyses supporting 2011 Cascadia Preparedness





Regular inpatients over time for four scenarios

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Discussions